

CONTRIBUTIONS FROM THE UNIVERSITY
OF MICHIGAN HERBARIUM, NO. 2

STUDIES IN THE GENUS
CORTINARIUS I

BY
ALEXANDER H. SMITH

ANN ARBOR
UNIVERSITY OF MICHIGAN PRESS
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STUDIES IN THE GENUS *CORTINARIUS*. I

DURING the fall of 1935 and again in 1937 I (15; 16) was enabled by means of grants from the Horace H. Rackham School of Graduate Studies of the University of Michigan to make a critical study of the species of *Mycena* occurring in Washington, Oregon, and northern California. In addition, species in other genera of the Agaricaceae were studied as opportunity permitted. The abundance of excellent material of the many species of *Cortinarius* collected on both occasions has made possible an intensive study of that genus.

The history of investigations in North American *Cortinari*i is rather brief and centers around the work of two men, C. H. Peck, for many years State Botanist of New York, and C. H. Kauffman, of the University of Michigan. Because of the limitations of his day Peck collected chiefly around Albany and in the Catskill and Adirondack Mountains of New York. Kauffman collected intensively in southern Michigan, and on various occasions in the eastern, southern, and western United States as well. His collections of *Cortinari*i in Colorado, Wyoming, Montana, northern Idaho, the Olympic Mountains of Washington at Lake Quinault and Lake Cushman, around Mount Hood, Oregon, and in the Siskiyou Mountains of southern Oregon are the basis of our knowledge concerning the genus in the western states.

Because of the sporadic appearance of agarics, one may not find large numbers of specimens even during apparently favorable seasons, and during dry years an expedition may yield little or no material. These two factors were responsible for the meager collecting experienced by Kauffman on several occasions. In fact he found species of *Cortinarius* abundantly only in Colorado and the Olympic Mountains of Washington. The western slope of the Cascade Mountains and the entire region of southern Oregon and northern California thus remained practically unexplored as far as this group was concerned.

During the season of 1935 I located at Lake Crescent in the Olympic Mountains, Lake Tahkenitch on the Oregon coast, and at Trinidad on the northern coast of California. In 1937 two

weeks were spent at Blue River, Oregon, just west of McKenzie Pass in the Cascade Mountains, and the remainder of the season at Crescent City, California. The Crescent City location was exceptionally favorable, because, with the aid of a car, one had easy access to the dense spruce forests of the coast, the redwood forests, the subalpine associations in the Coast Range and Siskiyou Mountains, and the drier oak and pine areas of southern Oregon.

Modern authors often differ considerably in regard to their interpretations of the older species of *Cortinarius*. In the present study, where discrepancies exist, my determinations are based on Kauffman's (8) concepts unless otherwise qualified. In regard to *Cortinarius orichalceus* Fries, for instance, Kauffman described it as without a distinct odor, whereas Henry (6) ascribes a fragrant odor to it. There is obviously a great need for further investigations in any group in which discrepancies of this nature exist.

In this study fourteen species and one variety are described as new. Sixteen species not previously reported for North America have been critically studied and identified. Notes on range extensions of forty-seven species are also given. All of these except *Cortinarius sphagnophilus* Pk. and *Cortinarius miniatopus* Lange were collected in Washington, Oregon, or California. Interesting habitat data have been obtained for many species, and, in North America at least, the evidence accumulated indicates that the members of this genus are able to adapt themselves to a variety of habitats. Many, such as *Cortinarius calochrous* Fries, may occur either in hardwood forests or under conifers.

The collections cited have all been deposited in the Herbarium of the University of Michigan. The color names within quotation marks are taken from R. Ridgway, *Color Standards and Color Nomenclature* (Washington, D. C., 1912).

SUBGENUS MYXACIUM

Cortinarius ponderosus sp. nov. (Pl. I).—Pileus 11–35 cm. latus, convexus, demum subplanus, glutinosus, subcastaneus, margine luteus vel subcastaneo-virgatus; caro sordide albida, odore subnauseoso; lamellae confertae, angustae, adnatae vel

brevissime decurrentes, pallide purpureo-vinaceae demum subcastaneae; stipes 10–20 cm. longus, 3–6.5 cm. crassus, solidus, basi viscidus, luteo-fibrillosus, pallide brunneus demum subcastaneus; sporae $8.5-11 \times 5-6 \mu$. Specimen typicum legit A. H. Smith n. 9273, prope Cave City, Oregon, Dec. 1, 1937, in Herb. Univ. of Michigan conservatum.

Pileus 11–35 cm. broad, convex, becoming nearly plane, very glutinous, disk with agglutinated appressed spotlike scales or areolate in age, color “russet” on the disk, toward the margin streaked with “russet” on a “mustard yellow” background, margin more nearly “yellow ocher” in age, gluten yellowish; flesh whitish, thick, unchanging, odor faintly spermatic as in many species of *Inocybe*, taste disagreeable; lamellae narrow, crowded, adnate, becoming slightly decurrent, tinged purplish vinaceous near the margin when young, soon sordid ocher yellow, in age russet, often staining russet before the spores mature and appearing quite spotted; stipe nearly equal or tapered abruptly at the base, 10–20 cm. long, 3–6.5 cm. thick, solid, whitish at extreme base, lower third varnished or streaked with the remnants of the glutinous, yellow universal veil, subannulate above, apex silky striate with ocher fibrils, flesh whitish, surface pale brownish, becoming “russet” over the lower portion in age; spores $8.5-11 \times 5-6 \mu$, subalmond-shaped, roughened, pale tawny under the microscope; no differentiated sterile cells seen on the gill edges; flesh of the pileus and the gill trama with numerous lactiferous hyphae as in many species of *Inocybe*.

In arcs under *Pinus ponderosa* Dougl. and various species of *Quercus*, near Cave City, Oregon, Nov. 29, 1937 (8191) and Dec. 1 (9273-type); under spruce, Crescent City, California, Dec. 7, 1937 (9477).

Several dozen of these monstrous fruiting bodies were found on December 1. Additional observations on the gill color of immature specimens are desirable, since the color change from purplish vinaceous to sordid ocher yellow is admittedly peculiar. Other characters, however, such as the yellow gluten, the change to russet of cap, gills, and stipe in age, the whitish flesh, sordid ocher gills throughout most of its development, the massive

stature, *Inocybe*-like odor and lactiferous hyphae distinguish it. *Cortinarius griseoluridus* Kauff. seems to be its closest relative but is distinguished by avellaneous gills before the spores mature and the smoky gray ground color of the pileus. In addition, it dries a dull yellow, whereas *C. ponderosus* is usually darker and more reddish brown when dried.

***Cortinarius pallidifolius* sp. nov.** (Pl. II).—Pileus 5–9 cm. latus, convexus, glutinosus, subcrustulinus, margine fibrillosus; caro albida, inodora, sapore miti; lamellae albae, demum alutaceae; stipes 10–15 cm. longus, sursum 10–15 mm. crassus, clavatus, basi 25–30 mm. crassus, glutinose peronatus; sporae 9–12 (13) $\times$ 5–6.5 μ . Specimen typicum legit A. H. Smith n. 3244, prope Olympic Hot Springs, Olympic Mountains, Washington, Oct. 19, 1935, in Herb. Univ. of Michigan conservatum.

Pileus 5–9 cm. broad, convex to plane with an elevated margin, evenly “tawny” or “ochraceous-tawny,” covered at first by thick masses of gluten, viscid in age, margin faintly fibrillose; flesh thick, white, soft, odor and taste not distinctive; lamellae white, changing slowly to near “wood brown,” adnexed, close to crowded, moderately broad, edge even to slightly eroded; stipe 10–15 cm. long, 10–15 mm. thick at the apex, 25–30 mm. thick at the base, clavate, solid but becoming hollow, white within, surface covered by a glutinous sheath, gluten yellowish brown, cortina copious and white and forming a white sheath under the yellow gluten, in age the sheath breaks up into fibrillose zones over the lower portion, apex white and silky; spores 9–12 (13) $\times$ 5–6.5 μ , roughened, dark rusty brown under the microscope, almond-shaped; no differentiated sterile cells seen on the gill edge.

Scattered to gregarious under fir, Boulder Creek, Olympic Mountains, Washington, Oct. 15, 1935 (3169), near Olympic Hot Springs, Oct. 19 (3244-type), and at Lake Crescent, Washington, Oct. 18, 1935 (3216). In 1937 it was found on the south fork of the McKenzie River in the Willamette National Forest, Oregon, Oct. 20 (7981) and at Blue River, Oregon, Oct. 22 (8078).

It is easily recognized by the clavate glutinous stipe which is usually faintly zoned near the base, white lamellae at first, and

the tawny to ochraceous tawny pilei. The glutinous universal veil reminds one of species in the section Colliniti, but the clavate stipe places it in the section Delibuti where it should be arranged beside *Cortinarius nitidus* Fr. ex Schaeff. The yellowish gluten on the stipe and the dense white fibrillose sheath beneath should separate it readily from that species. In addition, the pileus of the American species is apparently a darker brown.

Cortinarius citrinifolius sp. nov.—Pileus 3–5.5 cm. latus, convexus vel late umbonatus, glutinosus, disco subaurantiacus, margine subochraceus; caro citrina, odore forti gratissimo; lamellae citrinae, demum fulvo-cinnamomeae; stipes 7–9 cm. longus, 9–12 mm. crassus, subclavatus, glutinosus, pallide citrinus, apice furfuraceus; sporae $8-10 \times 5.5-7 \mu$. Specimen typicum legit A. H. Smith n. 3158 prope Boulder Creek, Olympic Mountains, Washington, Oct. 15, 1935, in Herb. Univ. of Michigan conservatum.

Pileus 3–5.5 cm. broad, convex to broadly umbonate, very glutinous when wet, nearly “ochraceous-orange” on the disk, “ochraceous-buff” toward the margin; flesh “citron yellow,” thick on the disk, taste slight but not distinctive, odor sharply fragrant; lamellae adnate, close, broad, pale yellow (“citron yellow”) becoming cinnamon brown in age, edge even; stipe 7–9 cm. long, 9–12 mm. thick, slightly clavate, glutinous to near the apex, pale yellow, slightly fibrillose furfuraceous above, annular zone evanescent, sordid yellowish below and changing to brownish where handled; spores $8-10 \times 5.5-7 \mu$, rough, broadly almond-shaped, cinnamon brown under the microscope; sterile cells not differentiated.

Gregarious under fir, Boulder Creek, Olympic Mountains, Washington, Oct. 15, 1935 (3158-type).

The bright yellow flesh and young gills, more or less ochraceous pilei, somewhat clavate stipe, and fragrant odor distinguish it. The odor and colors remind one of *C. percomis* Fr., but the glutinous stipe definitely distinguishes it from that species.

Cortinarius oregonensis sp. nov.—Pileus 2–4 cm. latus, convexus vel subumbonatus, viscosus, isabellinus, margine lilacinus et fibrillosus; caro violaceo-brunnea, inodora, sapore miti; lamellae incarnato-lilacinae demum crustulinae; stipes 6–10 cm.

longus, 5–10 mm. crassus, clavatus, viscidus, violaceus demum pallidus; sporae 7–8 (9) $\times$ 4–5 μ . Specimen typicum legit A. H. Smith n. 3557 prope Florence, Oregon, Nov. 19, 1935, in Herb. Univ. of Michigan conservatum.

Pileus 2–4 cm. broad, convex then slightly umbonate or becoming plane, glutinous when wet, disk near “cinnamon-buff,” margin “pale lavender-violet,” in age very pale violaceous white with a somewhat yellowish disk, occasionally streaked by appressed concolorous fibrils, margin somewhat violet-fibrillose from the partial veil; flesh thick on the disk, watery violet-brown, rather cartilaginous, taste and odor not distinctive, pellicle not bitter; lamellae “chinese violet” at first, becoming paler and finally brownish, close, depressed adnate, moderately broad, edge even; stipe 6–10 cm. long, 5–10 mm. thick, slightly enlarged below, lower portion viscid from a thin glutinous universal veil, peronate with a bright violet fibrillose sheath which soon fades to violaceous white, apex violet at first, white in age; flesh in the apex concolorous with the young gills, white in age, whitish below; spores 7–8 (9) $\times$ 4–5 μ , ellipsoid, nearly smooth; no differentiated sterile cells seen on the gill edge.

Gregarious under spruce, Lake Tahkenitch, Oregon, Nov. 19, 1935 (3557-type); Florence, Oregon, Nov. 19 (3565); Lake Tahkenitch, Nov. 23, 1935 (3600).

The small spores, bright pinkish lilac gills when young, the peronate violet-fibrillose sheath on the stipe, and the pale lilac pileus with its brownish to yellowish disk and lack of a bitter pellicle distinguish the species. It is closely related to *Cortinarius iodes* B. & C., from which both the colors and smaller spores separate it. *C. grisiolilacinus* Britz. is apparently close but should have a grayish lilac pileus.

CORTINARIUS ELATIOR Fr. (Pl. III).—Gregarious under spruce near La Push, Washington, Oct. 26, 1935 (3532), and in a forest of mixed conifers and hardwoods on the Mad River in northern California, Dec. 9, 1935 (H. E. Parks & A. H. Smith, No. 3899). During the season of 1937 it was abundant in northern California under spruce near Crescent City (Nov. 4, No. 8432; Nov. 8, No. 8537; Nov. 9, No. 8554). It was also collected under redwoods

near Trinidad, Nov. 12 (8649). Kauffman (8) gave its distribution as limited to the conifer forests of the higher mountains of Washington. The above collections extend its known range along the West coast down to sea level and south into California. All of the collections cited were found under conifers, but it is apparently not associated exclusively with any particular species.

CORTINARIUS IODES B. & C.—Scattered under alder and fir, Lake Crescent, Washington, Oct. 18 (3217), and near Joyce, Washington, Oct. 28, 1935 (3385). Kauffman (8) reported it as known from New England to South Carolina. Apparently the above collections are the first records of its occurrence on the Pacific coast.

CORTINARIUS MUCOSUS (Bull.) Ricken.—Singly under redwood, Trinidad, California, Nov. 12, 1937 (8660). This species has been known previously in the eastern states from Michigan to Maryland and Alabama. The above collection represents the first record of it from the western states, and since it is usually considered as one of the distinct elements of our southeastern agaric flora its occurrence in California is of additional interest.

CORTINARIUS SALOR Fr.—Scattered to gregarious under spruce, Fort Dick, California, Nov. 14 (8717), and in a similar habitat near Crescent City, Nov. 21, 1937 (8982). The species was previously known in North America from New York and Nova Scotia. See Smith and Wehmeyer (17).

CORTINARIUS SPHAEROSPORUS Pk.—Rare; under Douglas fir, Blue River, Oregon, Oct. 16, 1937 (7848). *Cortinarius delibutus* Fr. is the most closely related species and the one usually reported from the western states. The above collection, however, is similar to material I have collected in Michigan, particularly in the truly violaceous gills of young specimens. A critical study of both of these based on abundant material is highly desirable.

CORTINARIUS SPLENDIDUS Pk.—Scattered under spruce, Fort Dick, California, Oct. 30, 1937 (8222). This collection extends the known range of the species in North America to the Pacific coast. Kauffman collected it in Colorado.

CORTINARIUS STERILIS Kauff.—Scattered under spruce, Fort Dick, California, Nov. 8, 1937 (8540). It has been reported from

Washington and Oregon as well as from the eastern states.

CORTINARIUS VIBRATILIS Fr.—Singly under fir, South Fork, McKenzie River, Willamette National Forest, Oregon, Oct. 20, 1937 (7994); at Crescent City, California, Nov. 3 (8380), and Nov. 9, 1937 (8566). It is a common and widely distributed species. The above records extend its range from Washington and Oregon south into California.

SUBGENUS BULBOPODIUM

Cortinarius volvatus sp. nov. (Pl. IV).—Pileus 3–7 (9) cm. latus, convexus, glutinosus, albo-fibrillosus, pallide caesio-cinereus demum sordide albidus; lamellae lazulinae; stipes 4–6 cm. longus, 5–10 mm. crassus, basi bulbo marginato praeditus, subvolvatus, albo-violaceus; sporae $7-9 \times 5-6 \mu$. Specimen typicum legit A. H. Smith n. 8857 prope Crescent City, California, Nov. 18, 1937, in Herb. Univ. of Michigan conservatum.

Pileus 3–7 (9) cm. broad, convex, becoming nearly plane, glutinous, viscid in dry weather, with white appressed fibrils beneath the gluten, margin white fibrillose, becoming somewhat streaked in age, color “light Quaker drab” at first, fading to “pallid mouse gray” or whitish; flesh “light Quaker drab,” soon fading to whitish with a violaceous tinge, rather thin, odor none, taste bitterish; lamellae “dark grayish lavender” at first, becoming “Ramier blue” and remaining this color until masked by the spores, narrow, crowded, adnate; stipe 4–6 cm. long, 5–10 mm. thick, equal above a rounded bulb, whitish violaceous from a dense pale violaceous coating of fibrils, bulb surrounded by a whitish volva-like sheath with its torn margin appressed against the stipe just above the bulb, bulb rounded below and with a flaring limb which disappears in age; spores $7-9 \times 5-6 \mu$, ovoid, slightly roughened, tawny under the microscope.

Gregarious to scattered under spruce, Crescent City, California, Nov. 3 (8359), Nov. 5 (8457); Fort Dick, California, Nov. 10 (8599); and Crescent City, California, Nov. 18, 1937 (8857-type).

The pale bluish gray to whitish appressed-fibrillose pileus, the bluish lilac gills throughout most of its development, small bulb,

almost membranous volva, and small spores allow it to be easily recognized. From *Cortinarius caerulescens* and other species such as *C. sodagnitis* Henry, *C. dibaphus* (see Henry [6]), and *C. Dionysae* Henry, it is distinguished by its much smaller spores, duller more dingy pilei, and very likely by the more volvate remains of the universal veil. Lange has described a small-spored species under the name *C. caerulescens* and thus differs from most European and American investigators who have accepted the investigations of Maire (12). The fungus Lange has classified under this name apparently resembles *C. michiganensis* Kauff. rather closely but differs in the colors of the young gills. *C. volvatus* differs from *C. caerulescens* of Lange in its smaller bulb, paler more fibrillose cap, and brighter gills. *C. volvatus* seems closest to *Cortinarius aggregatus* Kauff., from which it is readily separated by its paler pilei in all stages of development, and also by its habit and habitat.

Cortinarius olympianus sp. nov. (Pl. V).—Pileus 3–7 (10) cm. latus, convexus, glutinosus, pallide violaceus, demum albo violaceus; caro albida vel cinerea; lamellae carneo-lilaceae demum lilaceo-brunneae; stipes 4–6 cm. longus, 8–10 mm. crassus, basi bulbo marginato praeditus, lilaceus; sporae $8-10 \times 5-6 \mu$. Specimen typicum legit A. H. Smith n. 3242 prope Olympic Hot Springs, Washington, Oct. 19, 1935, in Herb. Univ. of Michigan conservatum.

Pileus 3–7 (10) cm. broad, convex, becoming plane, the margin remaining inrolled a long time, glutinous, color evenly “pale lobelia violet” to “pale lilac,” becoming “pale violet-plumbeous,” and finally fading to whitish with a faint lilac tint in age, sometimes yellowish on the disk; flesh thick on the disk (5 mm. $\pm$), white to grayish, odor and taste not distinctive; lamellae “pale pinkish lilac” in expanding buttons, brownish but strongly tinged lilac at maturity, narrow, slightly adnexed, crowded, edge even; stipe 4–6 cm. long, 8–10 mm. thick, equal above a broad depressed marginate bulb which is tapered below (15–20 mm. broad), color at first “pale lobelia violet,” in age “Hay’s lilac” above and somewhat sordid brownish below, “Hay’s lilac” within near the cortex, pith whitish, cortina scant and pale lilac-white; spores $8-10 \times 5-6 \mu$,

ovoid to slightly inequilateral, slightly roughened, rusty brown under the microscope; no sterile cells seen.

Gregarious under fir, Boulder Creek, Olympic Mountains, Washington, Oct. 15 (3160), Oct. 19, 1935 (3242-type, 3243); Cave Junction, Oregon, Nov. 29, 1937 (8214).

The pinkish lilac lamellae, pale lilac to violaceous pileus, and small spores distinguish it. It is most closely related to *Cortinarius caesiocyaneus* Britz. from which it is readily distinguished by the slightly smaller spores and pinkish lilac gills.

Cortinarius calyptratus sp. nov. (Pl. VI).—Pileus 4–8 cm. latus, convexus, viscidus, violaceus demum vinaceo-violaceus, calyptratus; caro sordide cinnamomea; lamellae pallide violaceae; stipes 7–9 cm. longus, 10–15 mm. crassus, basi bulbo marginato praeditus, pallide violaceus, fibrillosus, sporae 7–9×4.5–6 μ . Specimen typicum legit A. H. Smith n. 8352 prope Crescent City, California, Nov. 3, 1937, in Herb. Univ. of Michigan conservatum.

Pileus 4–8 cm. broad, broadly convex, then plane, margin usually decurved and inrolled, slimy or viscid, evenly “deep slate-violet” to “slate-violet (2)” at first, nearly “dark vinaceous-gray” in age, disk covered more or less by a felty-fibrillose mass of universal veil remnants which are at first pale violet and fade to whitish or sordid violaceous, flesh “cinnamon-buff” in buttons and mature caps, watery and sordid in age, in the stipe colored violaceous near the periphery at the apex, “cinnamon-buff” elsewhere, odor and taste not distinctive; lamellae “deep dull lavender” at first, changing slowly to near “clay color,” very narrow and crowded, adnexed; stipe 7–9 cm. long, 10–15 mm. thick, equal above a broad marginate bulb, surface “deep dull lavender” or brighter at first from the copious lavender fibrils which cover it, fading slowly, and finally rusty violaceous—particularly where handled; bulb not depressed, 2–3 cm. broad, covered by a pale violaceous mass of mycelium which permeates the surrounding debris, mycelium sordid buff or yellowish in age; spores 7–9×4.5–6 μ , subalmond-shaped, rusty brown under the microscope, roughened.

Gregarious under mixed spruce and redwood, Crescent City, California, Nov. 3, 1937 (8352-type).

The mass of fibrillose debris on the pileus, the dark violet colors, cinnamon-buff flesh, lavender gills, and small spores are distinctive. *C. volvatus*, *C. olympianus*, *C. calyptratus*, *C. aggregatus*, and *C. michiganensis* form a series of small-spored species closely related to a series of larger-spored forms in Europe containing *C. caesiocyaneus*, *C. caerulescens*, *C. sodagnitus*, *C. dibaphus*, and *C. Dionysae*. Of the latter, Kauffman recognized *C. caesiocyanus* and *C. caerulescens* in North America.

Cortinarius occidentalis sp. nov.—Pileus 4–9 cm. latus, convexus vel planus, caeruleo-violaceus, demum cinereo-caeruleus, glaber, glutinosus; caro cinereo-caerulea, fracta purpurascens; lamellae caeruleo-violaceae, tactu purpurascens; stipes 5–7 cm. longus, 10–16 mm. crassus, basi bulbo marginato praeditus, caeruleo-violaceus, tactu purpurascens; sporae 7–9 (10) $\times$ 5–5.5 μ . Specimen typicum legit A. H. Smith n. 8654 prope Trinidad, California, Nov. 12, 1937, in Herb. Univ. of Michigan conservatum.

Pileus 4–9 cm. broad, convex to plane or the margin undulate or wavy at maturity, margin long remaining incurved and striatulate at maturity, glutinous, color evenly “dark dull bluish violet (2)” to “dull violet-blue,” soon fading on the disk to “pale mouse gray,” glabrous and not variegated or streaked; flesh “pale mouse gray,” but changing to “purplish lilac” when bruised, odor and taste none; lamellae concolorous with young pilei, broad, moderately close, adnate, seceding readily, changing to “purplish lilac” when bruised, tawny brown at maturity; stipe 5–7 cm. long, 10–16 mm. thick, equal above a flaring marginate bulb which tends to disappear in age, faintly fibrillose from veil remnants, concolorous with the pileus, solid, changing to “purplish lilac” when bruised, flesh bluish within at first; spores 7–9 (10) $\times$ 5–5.5 μ , slightly roughened, ovoid, pale rusty brown under the microscope.

Gregarious under fir, Olympic Hot Springs, Olympic Mountains, Washington, Oct. 15 (3174 & 3161), Oct. 19, 1935 (3252); under redwood, Trinidad, California, Nov. 12, 1937 (8654-type).

The even, dark blue colors of all parts and the change to purplish lilac when bruised are distinctive. The species is closely related to *C. subpurpurascens* Fr. and to *C. purpurascens* Fr. The

latter is common along the Pacific coast. *C. occidentalis* is more brightly colored than either of these and in age fades to gray rather than becoming variegated with brown or reddish brown. In addition the color change is more pronounced and can be readily demonstrated on all parts of the fruiting body. *C. sphaerosperma* Kauff. is distinguished by its subglobose spores.

Cortinarius Parksiana sp. nov.—Pileus 8–12 cm. latus, convexus vel planus, glutinosus, purpureo-umbrinus, demum subtestaceus, margine sordide ochraceus, variegatus; caro griseo-lilacea; lamellae purpureae; stipes 10–12 cm. longus, 2–3.5 cm. crassus, basi bulbo (3.5–4.5 cm.) marginato praeditus; purpureus demum argentatus; sporae 10–12×6–7.5 μ . Specimen typicum legit A. H. Smith n. 8695 prope Trinidad, California, Nov. 12, 1937, in Herb. Univ. of Michigan conservatum.

Pileus 8–12 cm. broad, convex, becoming plane with a wavy undulating margin which remains inrolled and decurved until late maturity, glutinous, color evenly dull purplish umber when young, becoming “army brown” on the disk in age and near “tawny olive” along the margin, sometimes with watery streaks or splashes of “cinnamon brown,” margin hung with patches of whitish fibrils; flesh thick and firm, dull lilac gray in the pileus and fading to whitish, bright purple in the apex of the stipe but soon becoming lilac-buff, odor and taste not distinctive; lamellae “litho purple” when young, remaining dull purple until maturity, finally dusted cinnamon brown from the spores, narrow, crowded, adnate; stipe 10–12 cm. long, 2–3.5 cm. thick above the bulb, solid, bulb 3–4.5 cm. thick and flanged with a rounded limb, dull purple over all but fading rapidly to whitish lilac, often rusty brown from the spores, appressed silky over all, cortina white and not copious; spores 10–12×6–7.5 μ , slightly roughened, ellipsoid, rusty brown under the microscope; no sterile cells seen on the gill edge.

Cespitose to gregarious under redwood, Trinidad, California, Nov. 12, 1937 (8695).

No color changes were evident on any part, although the gills, owing to the removal of the spores, appeared more purplish after being rubbed. The species is named in honor of Mr. H. E. Parks

of Trinidad, California. It was collected with many other species, such as *C. cyanites*, *C. variicolor*, *C. purpurascens*, and *C. occidentalis*, on Mr. Parks's estate at Trinidad. It is distinguished from *C. purpurascens* by its larger spores, obscurely marginate bulb, and the unchanging flesh. Henry (3) recently has described a form *largusoides* of *C. purpurascens* which resembles my collection rather closely, especially in its large spores, but which apparently differs in its changing flesh. In North America *C. purpurascens* is consistently a small-spored species. Lange's recent account of it and *C. subpurpurascens* corresponds to Kauffman's (8) concept of these species and is closely in line with the Friesian descriptions.

Cortinarius subpurpureophyllus sp. nov.—Pileus 5–7 cm. latus, convexus, minute fibrillose squamulosus, viscosus, badius vel castaneus, margine fibrillosus; caro albida; lamellae pallide purpureae demum rubiginosae; stipes 8–15 cm. longus, 10–15 mm. crassus, solidus, basi bulbo marginato praeditus, pallide purpureus vel violaceus; sporae $9-12 \times 5-6.5 \mu$. Specimen typicum legit A. H. Smith n. 8164 prope Crescent City, California, Oct. 28, 1937, in Herb. Univ. of Michigan conservatum.

Pileus 5–7 cm. broad, convex, becoming plane or slightly umbonate, with inconspicuous fibrillose patches under a thin layer of gluten, margin incurved and cottony tomentose, veil remnants adhering in patches along the margin, color evenly "bay" or "chestnut" when young, paler reddish brown in age; flesh white, thick on the disk, thin on the margin, odor and taste mild; lamellae rather broad (5–7 mm.), crowded, depressed adnate to adnexed, pale dull lilac or "light mauve," slowly becoming dark reddish brown as the spores mature; stipe 8–15 cm. long, 10–15 mm. thick, solid, almost equal above an elongated somewhat pointed bulb, bulb flaring and marginate, underground portion white, pale lilac above from a copious fibrillose covering, flesh in apex violaceous but soon fading to white, rusty yellow or pale yellow over all in age, mycelium white; spores $9-12 \times 5-6.5 \mu$, roughened, ovoid, pointed at the ends, dark rusty brown under the microscope.

Gregarious under spruce, Crescent City, California, Oct. 28,

1937 (8164-type), Nov. 4 (8405); Siskiyou National Forest, California, Nov. 6 (8470); Fort Dick, California, Nov. 10 (8595); Crescent City, California, Nov. 9, 1937 (8561).

The dark reddish brown pilei, pale lilac gills and stipe, and the fibrillose patches under the gluten on the pileus are distinctive. This species is very close to *C. purpureophyllus* Kauff. I have collected the latter in Michigan, however, and find the pilei glabrous and more testaceous in color as well as lacking the dark reddish gills of the mature pilei of the western species.

CORTINARIUS CEDRETORUM Maire (Pl. VII).—Pileus 8–15 cm. broad, convex, becoming plane or with an uplifted margin in age, margin remaining inrolled for a long time, very glutinous at first, viscid in age, color “mustard yellow” to “naples yellow” near the margin or over all at first, the disk very soon becoming tinged with brick red, the reddish color deepening and spreading as the pilei expand, at maturity the disk becomes purplish brown and the margin a tawny red, cuticle beneath the gluten often breaking into minute appressed scales; flesh firm, thick, “lavender” under the cuticle (cuticle yellow, then reddish in section), pale lavender at maturity or whitish near the stipe, usually watery lavender above the lamellae, odor and taste not distinctive; lamellae close (95–115 reach the stipe), moderately broad (12 mm. $\pm$), nearly equal, “honey yellow” at first, becoming “chamois” and soon clouded with dull purplish red (near “livid purple”) or more brownish as the spores mature, the color changing on the gill edge first, edges even or crenulate; stipe 8–12 cm. long, 1.5–2.5 cm. thick at the apex, solid, whitish at the apex or pale lavender throughout, base furnished with a broad (4.5–7 cm.) marginate bulb, which is pointed at the base and “mustard yellow” to “strontian yellow” owing to the copious yellow veil, flesh in the base of the bulb yellowish, bulb and stipe both rubescent when bruised, the apex of the stipe often becoming “livid purple” in age; spores 10–13 $\times$ 7–8 μ , almond-shaped, “russet” in mass, roughened.

Gregarious or in arcs under spruce and fir, Sol Duc Hot Springs, Olympic Mountains, Washington, Oct. 17, 1935 (3181); Siskiyou National Forest, Smith River Canyon, California, Nov. 6, H. E. Parks and A. H. Smith (8503), and Nov. 15, 1937 (8735).

Cortinarius cedretorum has not been reported previously in North America. It was described from North Africa and has been reported from various localities in the Mediterranean region. The American collections apparently differ from typical material in that the gills as well as the pileus and stipe become reddish as the fruiting bodies mature. The dried pilei are "carob brown" to "chestnut-brown" near the margin and more or less "Mars brown" or darker on the disk. The colors of the dried specimens of *C. cedretorum* and of *C. orichalceus* allow the two to be easily distinguished.

CORTINARIUS GLAUCOPUS Fr. ex Schaeff. (Pl. VIII).—Pileus 6–12 cm. broad, broadly convex to plane, margin inrolled and slightly fibrillose at first owing to the remnants of the veil, glabrous on the disk, viscid, margin at first "ecru-olive" and remaining so until maturity, in age olive buff to sordid olivaceous gray, disk near "tawny-olive" or "sayal brown" at first, streaked toward the margin with "sayal brown" patches on an olive background; flesh thick, firm, sordid violaceous near the gills, yellowish under the cuticle on the disk, violaceous in the apex of the stipe but becoming yellowish in age, odor and taste not distinctive; lamellae narrow (5–7 mm. broad in pilei 10–12 cm. broad), close, adnate, edge even, color "plumbago gray" at first, color persisting until masked by the spores; dull argillaceous in age; stipe 6–8 cm. long, 2–3 cm. thick, bulb small but marginate at first (in longitudinal section appearing flanged) and obsolete in age, silky above the bulb from whitish fibrils, dull violet to silvery near the apex, sordid olivaceous brown below, with a mass of loose olivaceous to whitish fibrils surrounding the base; spores $6.5-8 \times 4.5-5 \mu$, roughened, subvoid to somewhat almond-shaped, rusty brown under the microscope.

Densely cespitose to gregarious in large troops and arcs under Douglas fir, elevation 2500 feet., near Olympic Hot Springs, Olympic Mountains, Washington, Oct. 19, 1935 (3237).

Kauffman (8) reported the species for "eastern United States to Wisconsin." In his collections it is represented by specimens found in 1912 in an oak-hickory woods near Ann Arbor. In view of the recent studies of Henry (3; 6) for this species in Europe, and because of the lack of critical data on American col-

lections from coniferous habitats, it seems advisable to give complete data on the Washington specimens. Although the spores are slightly smaller than the measurements usually given, the difference does not appear significant. To judge from my experience during two seasons, this is one of the common species along the Pacific coast. Additional collections have been found near Trinidad (3869) and Crescent City, California (8395, 8437). Evidence has been found which indicates that certain variant forms exist. In No. 8437 for instance, the spores measure $6-7 (8) \times 3.5-4 \mu$, and certain slight color differences were noted. In No. 8395 the spores measured $7-9 \times 5-5.5 \mu$. The pilei were "dark ivy green" to "andover green" and variegated with watery bluish lines or splashes. The color gradually changed to "dark grayish blue-green" or "dark medici blue" at maturity and the pilei became variegated with rusty yellow over the disks. The stipe and gills were "madder blue." The position of these two collections in relation to the species will remain doubtful until the constancy of the characters mentioned can be observed over a period of several seasons. Collections No. 3237 and No. 3869 are considered typical, and extend the known distribution of the species to Washington and California.

CORTINARIUS ARQUATUS Fr.—Gregarious under fir and cedar, Olympic Hot Springs, Olympic Mountains, Washington, Oct. 19, 1935 (3241, 3247). Kauffman (8) reported it from Colorado only, but in his collections there is also one from the Medicine Bow Mountains of Wyoming. The Washington material extends the known range of the species into the Pacific coast area.

CORTINARIUS CLAOCHROUS Fr.—Scattered under fir, Olympic Hot Springs, Olympic Mountains, Washington, Oct. 19, 1935 (3245, 3249); at McKenzie Bridge, Willamette National Forest, Oregon, Oct. 21, 1937 (8099). Kauffman (8) reported it from eastern United States, and in his collections from Lake Quinault, Washington, there is a closely related form which needs further study before it can be identified. My material was similar to the species as I have collected it in the oak-hickory woods of Michigan.

CORTINARIUS HERPETICUS Fr.—Collected under spruce near

Crescent City, California, Nov. 4, 1937 (8430). This is a widely distributed species, known in North America from Nova Scotia to Washington, but apparently not previously reported from California.

CORTINARIUS METARIUS Kauff.—Gregarious under fir, Olympic Hot Springs, Olympic Mountains, Washington, Oct. 19, 1935 (3248) and at Crescent City, California, Nov. 3, 1937 (8353). Kauffman collected it in Colorado and Wyoming.

CORTINARIUS MONTANUS Kauff.—Scattered under fir, Olympic Hot Springs, Olympic Mountains, Washington, Oct. 19, 1935 (3240). This, *C. scaurus* Fr., and *C. herpeticus* form a series in which one frequently encounters intergrading forms which are difficult to place.

CORTINARIUS MULTIFORMIS Fr.—Densely gregarious under fir, Lake Crescent, Washington, Oct. 12, 1935 (3110); near Crescent City, California, Nov. 4 (8409) and Nov. 9, 1937 (8557). Kauffman found this to be a common species in eastern United States, but had not collected it in the Pacific coast region. On the basis of the collections cited above, it appears to be as abundant in the West as in the East. Kauffman's failure to find it there is readily explained by the sporadic fruiting habits of species in this genus. The known range of *C. multiformis* in North America now extends from Nova Scotia to Washington and down the west coast to California.

CORTINARIUS ORICHALCEUS Fr.—Gregarious under fir, Boulder Creek, Olympic Mountains, Washington, Oct. 15 (3162), and at Sol Duc Hot Springs, Oct. 17, 1935 (3181). This species as recognized here, following Kauffman, is an odorless *Cortinarius* with pale whitish flesh. Henry (6) describes the species as having an anise-like odor and greenish yellow flesh. In view of these discrepancies, a comparison of European and American material would be highly desirable. For additional comments on the colors of the dried fruiting bodies see *C. prasinus*.

CORTINARIUS PRASINUS Fr.—Singly under Douglas fir, South Fork, McKenzie River, Willamette National Forest, Oregon, Oct. 20, 1937 (7973). Only two fruiting bodies were found, but they were in excellent condition. The spores measure 10–13×

6–8 μ , are almond-shaped and cinnamon brown as seen under a microscope. This species might be confused with *Cortinarius orichalceus* which has somewhat similarly colored gills and veil. Fruiting bodies of the latter, however, turn dark purplish red in all parts when dried (“dark mineral red” on the disk and “mineral red” near the margin). The specimens of *C. prasinus* dry “clove brown” on the disk and “citrine-drab” on the margin. The mycelium at the base of the bulb in *C. prasinus* remains white whereas that of *C. orichalceus* becomes “mineral red.”

CORTINARIUS PURPURASCENS Fr.—Gregarious under fir, Lake Crescent, Washington, Oct. 18 (3218), and Oct. 28, 1935 (3372); at Crescent City, California, Oct. 31 (8270); near the California-Oregon line on U. S. Highway 199, Nov. 20 (8963); and along Siskiyou Fork of the Smith River, California, Nov. 30, 1937 (9265). Apparently this species has not been previously reported in the Pacific coast region. The spores of these specimens consistently measure 7–9 $\times$ 4–5 μ .

CORTINARIUS SCAURUS Fr.—Gregarious under fir, Olympic Hot Springs, Olympic Mountains, Washington, Oct. 19, 1935 (3238), and at Crescent City, California, Oct. 28, 1937 (8214). The Washington collection corresponded exactly with Kauffman’s description. Apparently the species has been known in North America only from the Olympic Mountains.

SUBGENUS PHLEGMACIUM

CORTINARIUS CRASSUS Fr.—Pileus 10–12 cm. broad, convex to nearly plane, viscid when wet, pellicle scarcely separable, glabrous or at first streaked with fibrils on the margin, in age appressed or agglutinated fibrillose under a lens, the fibrils sometimes in patches on the disk causing a subscaly appearance, color “clay color” on the disk at first, margin paler and buff colored, becoming darker in age (“russet” to “cinnamon-brown”); flesh thick, white, compact, odor and taste not distinctive; lamellae white at first, close, broad, adnexed, edge even, dark cinnamon brown in age; stipe 8–13 cm. long, 12–15 mm. thick, equal or narrowed below, dry, solid, white silky at the apex, sordid brownish and fibrillose below, sordid brownish within; spores 9–11 (12) $\times$ 5–6 μ ,

narrowly ovoid to somewhat almond shaped, dark rusty brown under the microscope; cystidia not differentiated.

Singly under maple, Olympic Hot Springs, Olympic Mountains, Washington, Oct. 19, 1935 (3265).

The species is clearly a *Cortinarius* and its relationship to *C. balteatus* Fr. is quite striking. Although the Washington collection was found under maple along a stream, the habitat was dominated by conifers.

CORTINARIUS CROCEOCAERULEUS Fr. *sensu* Ricken.—Pileus 3–5 cm. broad, convex, becoming broadly convex, viscid, very glutinous in wet weather, glabrous beneath the gluten, “light violet” over all, fading to “pale bluish lavender,” in age becoming grayish on the disk or more sordid buff; flesh concolorous with the surface but soon fading to pallid or sordid whitish, moderately thick on the disk, thin near the margin, odor and taste not distinctive; lamellae “pale bluish lavender,” soon pallid brownish and at length discolored argillaceous from the spores, close, adnate, moderately broad, edge eroded; stipe 6–8 cm. long, 4–6 mm. thick, “pale violet” to “pale bluish lavender” over all at first, soon silvery whitish, fibrillose, equal, solid, dry; spores $7-8 \times 4-5 \mu$, slightly roughened, subellipsoid.

Scattered under fir, Olympic Hot Springs, Olympic Mountains, Washington, Sept. 29, 1935 (2754).

The specimens in this collection, as indicated, correspond to Ricken's (14) interpretation of the species. Henry (4) has recently placed a different *Cortinarius* under this name which, among other characters, possessed a subviscid stipe. Lange (11) has placed a species of the subgenus *Myxadium* under this name, referring *Cortinarius viola* Lange to it as a synonym. Since *C. croceocaeruleus* of Persoon was originally described as a *Phlegmacium* and has been so recognized by other authors, it seems best to use that name for our collection. The species of *Myxadium* referred to under this name by Lange and possibly that of Henry should be very carefully compared with *Cortinarius iodoides* Kauff.

CORTINARIUS SPHAGNOPHILUS Pk. (Pl. IX).—Pileus 4–6.5 cm. broad, convex, becoming plane or with an elevated margin at

maturity, viscid, glabrous, "Isabella color" to "light brownish olive" on the disk, the margin with "Dresden brown" watery spots on an "Isabella color" background, margin faintly striatulate when moist, the colors fading slightly in age; flesh thick on the disk, tapering abruptly near the margin, sordid buffy brown, odor and taste not distinctive; lamellae crowded to close, narrow, broadest toward the margin, adnexed, at first nearly "aniline lilac" but fading and slowly becoming sordid cinnamon brown as the spores mature; stipe 10–15 cm. long, 10–14 mm. thick, equal above a rounded bulb, bulb whitish but covered by a quickly fading yellowish coating of fibrils, "aniline lilac" and more or less fibrillose above the bulb, in age silky and brownish, stuffed becoming hollow, "aniline lilac" within at the apex at first, sordid bluish in age; spores $9-11.5 \times 6-7.5 \mu$, subovoid, distinctly roughened; sterile cells on the gill edge filamentous and branched, rare.

Scattered on sphagnum in bogs, Ko Ko Ko Bay, Lake Timagami, Ontario, Sept. 11, 1936, R. F. Cain and A. H. Smith (4794).

The fruiting bodies develop deep in the clumps of sphagnum and at maturity the pilei seldom project up to the surface. Consequently the species is very easily overlooked. It is seldom reported and has never been illustrated previously.

CORTINARIUS TURMALIS Fr.—Pileus 8–12 (15) cm. broad, broadly convex to nearly plane or sometimes with an obtuse disk, glutinous in wet weather, viscid normally, glabrous except for white fibrillose patches along the margin, color more or less tawny yellowish at first, becoming nearly "chestnut" on the disk and "tawny" near the margin, fading slightly in age; flesh thick (1.5 cm.) on the disk, white, firm, tapering abruptly near the margin, odor and taste not distinctive; lamellae white at first, slowly changing to dark cinnamon brown, broad, adnexed, close, edge somewhat uneven; stipe 8–12 cm. long, 1–2 (3) cm. thick, clavate, solid, hollowed in age, whitish or pallid over all, densely silky fibrillose from the copious white cortina; spores $8-10 \times 5-6 \mu$, very faintly roughened, pale tawny yellowish under the microscope, ovoid to subalmond shaped.

Gregarious to scattered under fir and cedar, Olympic Hot Springs, Olympic Mountains, Washington, Oct. 19, 1935 (3234, 3246), at Lake Tahkenitch, Oregon, Nov. 18, 1935 (3537).

Kauffman collected this species at Lake Quinault, Washington, in 1925. The exceptionally copious cortina is an outstanding character. Instead of forming an apical fringe on the stipe in my specimens, it was irregularly distributed over the lower two-thirds of the stem.

CORTINARIUS VARIICOLOR Fr. ex Pers. *sensu* Henry (4) (Pl. X). —Pileus 6–13 cm. broad, obtuse, at maturity plane with a depressed or elevated margin, glutinous when wet but soon dry, pellicle thin, at first more or less covered with fibrillose patches, margin inrolled and often with a fibrillose appendiculate zone and becoming plicate, undulate, or lobed in age, “purple-drab” to “vinaceous-drab” over all in buttons, soon becoming “natal brown” to “army brown,” in age “verona brown” on the disk or with a more purplish tinge; flesh “light lobelia violet” but fading quickly to grayish lilac, thick and hard, odor and taste not distinctive; lamellae “lobelia violet” but soon faded to grayish lilac, finally becoming “warm sepia,” close, moderately broad to narrow, adnexed, edge uneven to eroded; stipe 7–12 cm. $\times$ 12–15 mm. subfusiform, with a pointed base or with a somewhat rounded bulb, “lobelia violet” or whitish tinged lilac due to the dense pale lilac to whitish fibrillose covering, becoming evenly silky fibrillose below, solid or hollowed in age; spores 9–11 $\times$ 5–6 μ , subovoid to almond-shaped, roughened.

Cespitose to scattered under spruce, Crescent City, California. Abundant during November 1937 (8391, 8397, 8399, 8697, 8995).

Little is known of this species in North America. The only records of it among Kauffman’s material are two collections from H. C. Beardslee, Asheville, North Carolina, made in 1916 and tentatively determined as *C. variicolor* by Kauffman who noted that the spores were too small. Since the confusion between *Cortinarius praestans* Cord. with very large spores, and *C. variicolor* with smaller spores has been cleared up by European investigators, the American collections fall readily into place.

CORTINARIUS CYANOPUS Fr.—Gregarious under fir, Siskiyou

National Forest, California, Nov. 1, 1937 (8304). This is apparently a rare species in North America. Kauffman found it once in Colorado.

CORTINARIUS INFRACTUS Fr.—Gregarious or in troops under redwoods near Crescent City, California, Nov. 1 (8301) and Nov. 3, 1937 (8357). This species was very common under redwood throughout the season of 1937. Kauffman reported it from frondose and mixed forests.

CORTINARIUS LAPIDOPHYLLUS Pk.—Gregarious under fir, Lake Crescent, Washington, Oct. 13 (3122), Oct. 19 (3266), and Oct. 28, 1935 (3377). Kauffman (8) reported it as known only from the type locality near Ticonderoga, New York.

CORTINARIUS OPHIOPUS Pk.—Scattered to gregarious under fir, Belknap Springs, Oregon, Oct. 20, 1937 (8153). Kauffman (8) reported it as known only from the type locality in New York. Both this and the previous species are not well known and critical studies of them should be made.

CORTINARIUS PERCOMIS Fr.—Growing singly under spruce, Lake Tahkenitch, Oregon, Nov. 18, 1935 (3534) and along Siskiyou Fork of the Smith River, Nov. 30, 1937 (9264). Apparently it has not been reported from Oregon and California. Kauffman collected in it Colorado and Washington.

SUBGENUS INOLOMA

Cortinarius caesiifolius sp. nov.—Pileus 5–9 cm. latus, ovatus demum planus, siccus, innate fibrillosus, isabellinus demum brunneus, margine sordide luteus; caro pallida vel subbrunnea, odore nauseoso; lamellae caesiaae demum brunneae; stipes 8–13 cm. longus, 1–2 cm. crassus, caespitosus, clavatus, deorsum luteo-fibrillose peronatus, apice pallide violaceus; sporae $6-7.5 \times 5-6 \mu$. Specimen typicum legit A. H. Smith n. 3227 prope Olympic Hot Springs, Olympic Mountains, Washington, Oct. 19, 1935, in Herb. Univ. of Michigan conservatum.

Pileus 5–9 cm. broad, obtusely oval to convex, with an inrolled margin, expanding to nearly plane, not umbonate, surface dry, at first near “clay color” to “cinnamon-buff” or more yellowish, becoming darker in age, changing through “tawny-olive,” “snuff

brown," "warm sepia" and finally "Rood's brown," margin usually paler and remaining yellowish, surface at first densely innately fibrillose, nearly glabrous in age, not becoming scaly, margin usually hung with a fringe of yellowish fibrils, not hygrophanous; flesh thick, near pallid brownish drab or whitish, taste mild, odor fetid but soon vanishing; lamellae at first "pale quaker drab" to dull caesious, color sometimes darker in partly expanded pilei, finally dull brownish from the spores, adnate or slightly adnexed, edge even; stipe 8–13 cm. long, 1–2 cm. thick, cespitose, clavate but with a short pseudorhiza penetrating the soil (one or several fruiting bodies may arise from a thickened basal mass of tissue), lower half covered by concentric patches of "yellow ocher" universal veil remnants, somewhat peronate at first, pale violaceous and silky above, solid, flesh violaceous; spores $6-7.5 \times 5-6 \mu$, broadly ovoid to subglobose, rusty brown under the microscope; no differentiated sterile cells seen on the gill edge.

Cespitose along the side of a road, Olympic Hot Springs, Olympic Mountains, Washington, Oct. 19, 1935 (3227).

The odor is illusive and very easily missed. The dull yellow remnants of the veil on the stipe, small spores, pale bluish violet gills and stipe apex, and the dull yellowish pilei, which darken in age, are distinctive. It is apparently close to *C. diabolicus* Cke. but Cooke's illustration of that species pictures quite a different fungus. The yellow ocher remnants of the universal veil remind one of species in the subgenus *Telamonina* related to *C. gentilis* Fr. *C. perrarus* Britz. is close, but it has much larger spores and lacks the characteristic veil.

CORTINARIUS COTONEUS Fr. *sensu* Lange (11).—Pileus 4–8 cm. broad, obtuse when young, becoming convex, at maturity plane or slightly umbonate, surface dry, covered by numerous more or less minute fibrillose scales, margin appressed fibrillose, blackish olive brown on the disk at first, becoming "sepia" and finally fading through "buffy brown" to more or less "Isabella color"; flesh nearly "clove brown" when moist, fading to "Isabella color," rather thick and firm, odor and taste somewhat resembling that of radish; lamellae close to subdistant, narrow to moderately broad (1 cm. $\pm$), bluntly adnate or slightly sinuate in age, dull

yellowish brown at first, dark cinnamon brown in age; stipe 8–15 cm. long, 1–2 cm. thick, equal to slightly clavate, stuffed, covered over lower one-third by the variously disposed remnants of the olive yellow veil, somewhat tawny olive beneath, silky and paler olive yellow above; spores $7-8 \times 5-6 \mu$, ellipsoid, roughened.

Gregarious under fir, Olympic Hot Springs, Olympic Mountains Washington, Oct. 19, 1935 (3233), and Lake Crescent, Washington, Oct. 20 (3299).

In drying the scales on the cap become darker, and in herbarium specimens the pilei have blackish streaks on a dull olive green background. Henry (7) has given a critical discussion and description of this species. My specimens differ from the species as he described it in not having yellow olive gills at first, and in the paler sheath on the stipe. These differences very likely represent variations within the species. In Europe *C. cotoneus* is reported under hardwoods.

CORTINARIUS CYANITES Fr. (Pl. XI).—Pileus 7–15 cm. broad, broadly convex, becoming nearly plane at maturity or with a low umbo, surface covered by appressed fibrillose scales, the margin decorated with numerous patches of fibrils from the broken veil, apparently subviscid to the touch when wet but lacking a typical gelatinous pellicle, soon dry, “pale quaker drab” over all at first or more bluish, slowly changing to “natal brown” in age, the scales usually changing color first, the margin long remaining inrolled and dull lilac; flesh thick, firm, “madder blue” in cap and stipe or near “pale campanula blue” at base of stipe, slowly changing to “livid brown” when bruised, odor and taste not distinctive; lamellae “dusky blue violet (1)” at first, long remaining a dull violet, finally sordid brown, moderately close, adnate to adnexed, broad in age, edges even; stipe 10–15 cm. long, 2–3.5 cm. thick, clavate, base at first with a massive subcylindric bulb, bulb disappearing in age, surface more or less fibrillose from the remains of the cortina, often with a fibrillose zone just above the bulb from the remnants of the universal veil, dry, apex silky, solid, exuding a dark vinaceous brown juice when compressed; spores $8-10 \times 5-6 \mu$, roughened, somewhat almond-shaped.

Singly under an open stand of second growth redwood, Trinidad, California, Nov. 12, 1937 (8654).

This species was reported from New Hampshire by Krieger (10) in 1925. The slight viscidness of the pilei in my collection developed only after continued exposure in wet weather. No differentiated gelatinous pellicle is present. This tendency to become viscid was noted on several species in the subgenus *Inoloma* during the 1937 season, and may cause some confusion in making subgeneric separations. Under similar weather conditions, however, species of *Myxarium*, *Bulbopodium*, and *Phlegmacium* are very slimy or glutinous.

CORTINARIUS PSEUDOBOLARIS Maire.—Pileus 4–10 cm. broad, convex, becoming plane, margin often decurved, dry and minutely fibrillose especially near the margin, when wet subviscid but no gelatinous pellicle present, color sordid whitish or grayish white at first, soon “cinnamon-buff,” with a yellowish or reddish tinge over all at maturity or when old; flesh thick, firm, tapering abruptly at the margin, white or buff, when cut soon staining bright yellow and finally reddish orange, odor and taste not distinctive; lamellae narrow (5 mm. $\pm$ at maturity), crowded, equal or tapering gradually to the margin, narrowly adnexed, “cinnamon” to “ochraceous-tawny” at maturity, pallid brown at first but soon darkening, changing to yellow and finally orange-brown when bruised, edge even; stipe (4–8) 9–14 cm. long, 10–20 mm. thick, narrowed toward the base and subrooting or if cespitose more or less clavate, solid, fleshy, white at first, fibrillose from the remains of the cortina, becoming bright yellow when rubbed or bruised and finally reddish, more or less reddish brown over all in age; spores 6–6.6 (8) $\times$ 3.5–4 μ , slightly roughened, ventricose to subellipsoid; basidia four-spored; cystidia scattered on side and edge of gills, 32–46 $\times$ 7–13 μ , cylindric, clavate to subfusoid.

Singly to cespitose, on humus under spruce, Cape Flattery, Washington, Sept. 18, 1935 (2487); Crescent City, California, Nov. 22, 1937 (8988); and under redwood, Prairie Creek State Park, Orick, California, Nov. 28, 1937 (9172).

The whitish to grayish colors which become reddish in age, the changing flesh and gills, and small spores are distinctive. The spores of my collections are distinctly smaller than the measurements given by Maire and are more ventricose than he indicated in his illustration. In addition the color change to orange or red-

dish brown is slower and not as bright as described for the European specimens. The herbarium specimens of my collections, however, are tinged "Kaiser brown" to "hazel." Although spore size is one of the most reliable characters in *Cortinarius*, I do not believe the difference is great enough to be of use in segregating a species or variety in this instance.

CORTINARIUS CAMPHORATUS Fr.—Gregarious under spruce, Florence, Oregon, Nov. 22, 1935 (3605); under redwoods, Trinidad, California, Nov. 25, 1935 (3631); under spruce, Crescent City, Nov. 5 (8455), and at Trinidad, Dec. 6, 1937 (9491). Kauffman (8) reported this species from the Adirondack Mountains in New York. It was fairly abundant during the 1937 season in California. As in *C. cyanites*, after exposure to continued wet weather, the surface hyphae on the pileus gelatinize slightly.

CORTINARIUS CANESCENS Pk.—Gregarious under spruce, Crescent City, California, Nov. 11, 1937 (8651). This species has not been previously reported for the western United States.

SUBGENUS DERMOCYBE

Cortinarius phoeniceus (Bull.) Maire var. *occidentalis* var. nov.—Pileus 3–8 cm. latus, convexus vel umbonatus, siccus, fibrillosus, subhepaticus; lamellae sordide sanguineae; stipes 4–7 cm. longus, 6–12 mm. crassus, pallide luteus vel deorsum vinaceus; sporae $6-7.5 \times 4-4.5 \mu$. Hyphae luteae. Specimen typicum legit A. H. Smith n. 3485 prope Florence, Oregon, Nov. 14, 1935, in Herb. Univ. of Michigan conservatum.

Pileus 3–8 cm. broad, broadly convex, becoming expanded and somewhat umbonate, usually with a decurved margin, surface dry, innately silky under a lens, becoming appressed fibrillose at maturity, color evenly "ox-blood red" to "Garnet brown," often cracking radially in age; flesh rather thin, reddish near the cuticle, olive brown near the stipe, firm, odor and taste not distinctive; lamellae "Bordeaux" with a brighter almost "carmine" margin, with a changeable sheen when viewed at different angles, subdistant to distant or appearing close in small caps, broad, equal; stipe 4–7 cm. long, 6–12 mm. thick, equal, evenly "chamois" to "honey yellow," evenly covered by a coating of yellowish fibrils,

flesh "old gold," in age sometimes becoming sordid brown but never red when fresh, cortina scanty and "chamois" or paler yellow buff, mycelium around the base and in the soil "yellow ocher" or tinged vinaceous red in age; spores $6-7.5 \times 4-4.5 \mu$, pointed at one end, roughened.

Gregarious under fir, spruce and pine in Washington, Oregon, and California: Boulder Creek, Olympic Mountains, Washington, Oct. 15, 1935 (3159 & 3258); Siltcoos Lake, Oregon, Nov. 13, 1935 (3459); Florence, Oregon, Nov. 14 (3485-type); Blue River, Oregon, Oct. 17, 1937 (7891); McKenzie Pass, Oregon, Oct. 18, 1937 (7956); Crescent City, California, Nov. 2 (8339); Fort Dick, California, Nov. 10 (8591); Trinidad, California, Nov. 12 (8679); and Crescent City, California, Nov. 22, 1937 (8997).

Kauffman's collection from the Olympic Mountains in Washington upon which he based his report of *Cortinarius anthracinus* Fr. is referable to the variety described above. A careful study of a collection made by Kauffman in Sweden and determined as *C. anthracinus* shows it to be *C. phoeniceus* (Bull.) Maire. It was on this collection that Kauffman based his concept of *C. anthracinus*. Fries (2, p. 370) described the stipe of *C. anthracinus* as "intense sanguineo," a character which definitely eliminates that species from consideration in the present study. As yet the latter species has not been recognized in the agaric flora of North America. The dark red to reddish brown pilei, deep blood-red shimmering gills, the yellow stipe and small spores distinguish *C. phoeniceus* var. *occidentalis*. In dried specimens the base of the stipe is often tinged vinaceous red or darker, and the same color change takes place on old specimens in the field.

CORTINARIUS ANOMALUS Fr.—Gregarious under spruce, Crescent City, California, Oct. 31 (8282), Fort Dick, Nov. 10 (8589); Smith River, California, Nov. 16, 1937 (8810). This species is widely distributed throughout the Pacific coast states, but has apparently not been reported from California.

CORTINARIUS CINNAMOMEUS Fr.—Gregarious under fir, Blue River, Oregon, Oct. 17, 1937 (7909), and at Crescent City, California, Nov. 2, 1937 (8332).

CORTINARIUS CROCEOFOLIUS Pk.—Gregarious under spruce, Crescent City, California, Nov. 2 (8347), Nov. 9 (8563), and near the Oregon-California line Nov. 20, 1937 (8941). Kauffman (8) reported the species from New York. It has doubtless been considered as a variation of *C. cinnamomeus* by many collectors.

CORTINARIUS MALICORIUS Fr.—Scattered under redwood, Trinidad, California, Dec. 6, 1935 (3842). The habitat is interesting. Apparently the species has not been previously reported from California.

CORTINARIUS SANGUINEUS Fr.—Singly under Douglas fir, Boulder Creek, Olympic Mountains, Washington, Oct. 15, 1935 (3168). Under redwoods, Prairie Creek State Park, Orick, California, Nov. 28, 1937 (9156). Kauffman had not collected this species in the West, and I have found only scattered fruit bodies. It is apparently rather rare.

CORTINARIUS SUBNOTATUS Fr.—Gregarious under fir, Belknap Springs, Oregon, Oct. 23, 1937 (8137), under spruce, Crescent City, California, Oct. 30 (8255), Nov. 9 (8562), and on the Siskiyou Fork of the Smith River, California, Nov. 30, 1937 (9247). Kauffman (8) reported it from the Adirondack Mountains in New York.

SUBGENUS TELAMONIA

Cortinarius gentilissimus sp. nov.—Pileus 3–5 cm. latus obtuse conicus demum subumbonatus, fibrillosus, hygrophanus, fulve cinnamomeus vel subcastaneus, demum subhelvolus; lamellae isabellinae demum subhelvolae; stipes 8–15 cm. longus, 5–10 mm. crassus, aequalis, apice caesius, deorsum luteus, subperonatus; sporae $7-8 \times 4-5 \mu$. Specimen typicum legit A. H. Smith n. 8364 prope Crescent City, California, Nov. 3, 1937, in Herb. Univ. of Michigan conservatum.

Pileus 3–5 cm. broad, obtusely conic to convex, becoming plane or with a slight umbo, margin plane or elevated and wavy, at first silky fibrillose, the fibrils arranged in fascicles near the margin, fibrils “old gold” in color, “arugs brown,” “russet,” or “Prout’s brown” beneath the fibrils when moist, subhygrophalous, fading to “buckthorn brown” and then frequently with an olive sheen due to the thin fibrillose covering; flesh firm, con-

colourous with the surface, odor and taste not distinctive; lamellae close to moderately close, narrow but becoming ventricose and broad in age, "tawny-olive" at first, becoming "buckthorn brown" in age, edge even or somewhat eroded; stipe 8–15 cm. long, 5–10 mm. thick, narrowed below to a subrooting pointed base, hollow, pale bluish above and delicately silky, yellowish toward the base, slowly becoming sordid tawny to bister below, lower half peronate with a "raw sienna" sheath or with concentric fibrillose zones of the sheath remnants, silvery and silky beneath, flesh in the apex bluish, yellowish in the base; spores $7-8 \times 4-5 \mu$, ellipsoid, slightly roughened, rusty brown under the microscope; no differentiated sterile cells seen on the gill edge.

Gregarious under second growth spruce, Crescent City, California, Oct. 30 (8227), Nov. 3 (8364-type), Oct. 21 (8283), and Nov. 5, 1937 (8456).

The pale bluish apex of the stipe readily separates this species from *C. gentilis* Fr. and *C. confusus* Kauff. & Smith which are also characterized by yellow universal veils. In addition, *C. confusus* has an obtuse pileus, and *C. gentilis* has more distant gills.

Cortinarius washingtonensis sp. nov.—Pileus 2–5 cm. latus, obtuse conicus demum campanulatus vel subumbonatus, margine appendiculatus, hygrophanus, fusco-castaneus, expallens alutaceus; lamellae aquose cinnamomeae demum fulvo-cinnamomeae, tactu atro-brunneae; stipes 6–11 cm. longus, 3–8 mm. latus, cylindricus, apice violaceus, deorsum brunneus et albo-peronatus; sporae $6-7.5 \times 3.5-4 \mu$. Specimen typicum legit A. H. Smith n. 3272 prope Joyce, Washington, Oct. 21, 1935, in Herb. Univ. of Michigan conservatum.

Pileus 2–5 cm. broad, obtusely conic, becoming broadly campanulate or expanded and with a decurved margin, umbo often slight and the margin arched, disk nearly glabrous, margin hung with thickish pallid fibrillose patches from the copious universal veil, color blackish but with a purplish tinge and often canescent because of the fibrils, disk remaining blackish in age, the margin becoming "warm sepia" or dark reddish brown, subhygrophanous, fading to near "wood brown"; flesh 2–3 mm. on the disk, watery brown, odor and taste not distinctive; lamellae dull pallid

cinnamon at first, darker and near "sayal brown" at maturity, staining sordid blackish brown where bruised, close, moderately broad, adnate with a tooth, nearly equal, edge slightly uneven; stipe 6–11 cm. long, 3–8 mm. thick, stuffed, equal or the base slightly enlarged, flesh dull lilac at first and the apex faintly violet, fading to brownish, darker brownish below, lower portion with irregular concentric patches of universal veil remnants, the sheath continuous at first, fibrils faintly violaceous but soon fading to sordid whitish; spores $6-7.5 \times 3.5-4 \mu$, ellipsoid, nearly smooth, rusty brown under the microscope; no sterile cells seen on the gill edge.

Gregarious under cedar in a pasture, Joyce, Washington, Oct. 21, 1935 (3272-type, & 3298).

A rather distinctive species owing to the changing gills. In stature it is very similar to *C. nigrellus* Pk. In the color of the pileus and in the violaceous apex of the stipe it resembles *C. erythrinus* Fr. in the subgenus *Hydrocybe*.

CORTINARIUS PARAGUADIS Fr.—Pileus 1–4 cm. broad, obtuse, becoming plane, with a sharp umbo or at times only subumbonate, surface glabrous to the naked eye but under a lens appearing faintly fibrillose due to a thin coating of "tawny-olive" fibrils, subhygrophanous, "light seal brown" over all at first, becoming "sorghum brown" on the margin and finally fading to pale vinaceous brown with a darker disk, margin connivent to the stipe in button stages; flesh thick under the disk, thin elsewhere, "light seal brown" when moist, fading to dull vinaceous gray, odor and taste not distinctive; lamellae dull vinaceous brown with tawny edges, tawny vinaceous at maturity, often with a strong purplish red tinge in age or where bruised, subdistant, adnate, seceding, broad; stipe 5–6 cm. long, (2) 3–4 mm. thick, solid, equal, more or less tinged with "livid purple" and darkening to "dark livid purple" in age especially at the base, flesh brownish within, surface coated with appressed wine red fibrils near the base; spores $7-9 \times 4-5 \mu$ ellipsoid, roughened.

Scattered to gregarious under spruce, Crescent City, California, Nov. 4 (8402), Nov. 5 (8436); Fort Dick, California, Nov. 8 (8523); Crescent City, Nov. 9 (8565), Nov. 18 (8853), and Dec. 7, 1937 (9488).

This species is not too convincingly described by European authors. Ricken's description, however, covers the essentials of my collections. The dark reddish brown pileus and the purplish stipe with its covering of red fibrils and slender stem distinguish it. Lange's (11) illustration of *Cortinarius purpureo-badius* Karsten shows an agaric with distinctly different colors, although the specific name and both Karsten's and Lange's descriptions indicate a fungus very similar to mine.

CORTINARIUS BIFORMIS Fr.—Pileus 4–5 cm. broad, convex to obtuse, umbonate to plane at maturity, hygrophalous, “natal brown” when moist, fading to “cinnamon-buff” or reddish tawny around the disk, at first covered by white silky fibrils especially along the margin; flesh pallid or dull violaceous brown in the apex of the stipe, odor and taste not distinctive; lamellae subdistant to close, broad, adnexed, seceding, dull violaceous brown, soon concolorous with the pileus, edges white fimbriate; stipe 4–7 cm. long, 8–18 mm. thick, either equal and slender or short and bulbous, hollow, peronate by a white fibrillose sheath which terminates in a white annular median zone, silky fibrillose at the apex and with a whitish violaceous sheen; spores $7-8 \times 5-6 \mu$.

Gregarious under spruce, Crescent City, California, Oct. 31, 1937 (8286).

The young gills and the apex of the stem have an illusive violaceous brown tinge which is difficult to describe. It is a variable color, and in some the gills appeared gray as Rea (13) describes them. The differences in the shape of the stipe were not correlated with any other characters.

CORTINARIUS PSAMOCEPHALUS Fr. *sensu* Lange.—Pileus 1–3 cm. broad, convex to plane with an obtuse or acute conic umbo, umbo obsolete at times, hygrophalous, “cinnamon-brown” when moist, sometimes darker and “mummy brown” on the disk, fading to “cinnamon-buff,” margin sometimes striatulate when moist, surface covered by innate tawny brown fibrillose scales or merely fibrillose; flesh thin, watery cinnamon-brown when moist, cinnamon-buff faded, fragile, odor and taste not distinctive; lamellae “ochraceous-tawny” at first and remaining nearly the same color or becoming slightly darker at maturity, subdistant (20–25 reach the stipe), moderately broad, adnate, edge uneven;

stipe 3–5 cm. long, 2–3.5 mm. thick, equal, hollow, colored like the pileus or paler, toward the base with evanescent patches of tawny brown fibrils, sometimes subannulate, silky fibrillose toward the apex; spores 6–7.5 (8.5) $\times$ 4–5.5 μ , roughened, broadly ovoid.

Gregarious and very abundant under spruce, Crescent City, California, Oct. 31 (8279) and Smith River, California, Nov. 19, 1937.

The smaller spores and tawny brown fibrillose patches on the stipe separate this from *Cortinarius impolitus* Kauff. In North America both of these species seem to prefer a coniferous habitat. When their spores are compared under the microscope the differences are conspicuous. Those of *C. impolitus* are longer and narrower, more nearly smooth and somewhat inequilateral. Those of *C. psamocephalus* are broad, more conspicuously roughened, and ovoid. In *C. impolitus* occasional spores are found which are quite similar to those of *C. heterosporus* Bres.

CORTINARIUS BRUNNEOFULVUS Fr.—Gregarious under second growth redwood, Trinidad, California, Nov. 12 (8672), and under pine, Smith River, California, Nov. 16, 1937 (8795). It is interesting to note that the species was collected in pure stands of redwood in one locality and under a pure stand of pine in the other. Kauffman reported it from Oregon and Washington.

CORTINARIUS DECEPTIVUS Kauff.—Scattered under pine, Florence, Oregon, Nov. 20, 1935 (3573). This species apparently has not been reported previously from western United States.

CORTINARIUS DISTANS Pk.—Gregarious under yellow pine, Kerby, Oregon, Nov. 26, 1937 (9103). After collecting this species in Michigan in hardwood forests and under yellow pine in a local plantation near Ann Arbor, it was not surprising to find it in a yellow pine forest in Oregon. Kauffman reported it as occurring only in eastern United States.

CORTINARIUS FLEXIPES Fr.—Gregarious under spruce, Crescent City, California, Nov. 3, 1937 (8382). This is apparently a rare species in the western states, but not at all infrequent in the East. It is represented in the University of Michigan Herbarium by collections from New York, Ontario, and Michigan.

CORTINARIUS LANIGER Fr.—Gregarious under fir, Lake Crescent, Washington, Oct. 13 (3128), Oct. 14, 1935 (3141); near Crescent City, California, Nov. 9 (8571); and near the Oregon-California state line, Nov. 20, 1937 (8950). This is apparently a widely distributed species, but one which I have never collected abundantly. It has been reported for Washington and Oregon.

CORTINARIUS LUCORUM (Fr.) Kauff.—Scattered under spruce, Lake Tahkenitch, Oregon, Nov. 11, 1935 (3427). Kauffman (8) raised *C. impennis* var. *lucorum* Fr. to specific rank and placed *C. umidicola* Kauff. in synonymy with it.

SUBGENUS HYDROCYBE

Cortinarius californicus sp. nov. (Pl. XII).—Pileus 3–8.5 cm. latus, obtuse conicus, late campanulatus, demum obtuse umbonatus, margine rectus, glaber, hygrophanus, rufus vel rubiginosus, expallens pallide ferrugineus; caro rubiginosa; lamellae aurantio-ferrugineae; stipes 8–15 cm. longus, 5–15 mm. crassus; cylindricus, pallide ferrugineus, aurantio-fibrillosus; sporae $7-9 \times 4-4.5 \mu$. Specimen typicum legit A. H. Smith n. 8957 prope Crescent City, California, Nov. 29, 1937, in Herb. Univ. of Michigan conservatum.

Pileus 3–8.5 cm. broad, obtusely conic, becoming broadly umbonate with a decurved margin, glabrous, hygrophanous, evenly “Hay’s russet” when moist, fading to “cinnamon-rufous,” margin appressed against the stipe and faintly silky at first; flesh watery, moderately thick on the disk, concolorous with the surface in both moist and faded pilei, odor and taste not distinctive; lamellae “Mars orange” when young, “burnt sienna” in age, adnate, becoming slightly adnexed, narrow to moderately broad, subdistant, edges slightly serrate or only fimbriate; stipe 8–15 (20) cm. long, 5–15 mm. thick, equal, sometimes the base slightly enlarged and sometimes narrowed, becoming hollow, at first sparsely fibrillose below with orange fibrils from the remains of the cortina, dull orange over all (paler than the lamellae); mycelium orange-red; spores $7-9 \times 4-4.5 \mu$, ellipsoid to subovoid, distinctly roughened, dark rusty brown under the microscope; sterile cells not differentiated.

Scattered under fir and spruce, Blue River, Oregon, Oct. 17 (7898); Oct. 22 (8081); Belknap Springs, Oregon, Oct. 23 (8132); Siskiyou National Forest, California, Nov. 1 (8316); Nov. 6 (8487), Nov. 20 (8957-type), and Nov. 29, 1937 (9201).

This species belongs in the section *Tenuiores* of the subgenus *Hydrocybe* although its colors are apparently similar to those of *C. balaustinus* Fr. of the section *Firmiores*. Careful attention was given to the manner in which the margin of the pileus developed. The straight margin and conic pilei of young fruiting bodies were constant characters in my material. The pilei were not virgate and lacked innate fibrils. In Ricken's description of *Hydrocybe balaustina* the spores are given as globose. The spore size of the material Lange referred to the latter species is practically the same as in mine, but his plate can hardly represent *C. balaustinus* Fr. Fries (2) described its color as "rufo-ferrugineo (fulvo-testaceo nitido)."

CORTINARIUS COLUS Fr.—Pileus 2–3.5 cm. broad, convex becoming plane, hygrophanous, "chestnut-brown" or "bay" when moist, becoming "Rood's brown" to "pecan brown" and then faintly striatulate, hygrophanous, fading to a dull "onion-skin pink," glabrous or the margin with faint fibrillose patches, margin incurved at first; flesh "bay" or dark reddish brown, thin and firm, odor and taste not distinctive; lamellae "bay" with tawny edges when young, becoming "hazel" in age and if bruised changing to dark reddish brown ("carob brown"), narrow, adnate, close, edges even; stipe 5–9 cm. long, 3–6 mm. thick, slightly enlarged below, silky over all, with purplish red or vinaceous mycelium covering the base, apex violet at first, flesh within "dark indian red" in upper portion, "chestnut" in lower half, in age with a vinaceous sheen owing to a thin appressed fibrillose covering, no sheath or annular remains of a universal veil present; spores $6-7 \times 4-5 \mu$, ovoid, distinctly roughened, dark rusty brown under the microscope.

Gregarious under fir, Crescent City, California, Nov. 3 (8361) and Nov. 4, 1937 (8400).

Distinguished by the dark reddish brown pilei which are pale testaceous when faded, the dark reddish brown gills which be-

come ferruginous and darken again when rubbed, the purplish red mycelium and small spores. *C. balaustinus* is apparently a larger and fleshier fungus. My determination is tentative since it is impossible to obtain a clear concept of this species as it is known in Europe.

CORTINARIUS SANIOSUS Fr.—Pileus 1–2 cm. broad, obtusely conic with an obtuse umbo and a decurved margin, remaining unexpanded, surface with a thin innately silky fibrillose covering, fibrils yellowish, “burnt umber” over all when fresh, slowly fading to near “chestnut” on the disk and finally “Saccardo’s umber” over all; flesh moderately thick on the disk, thin on the margin, concolorous or paler than the surface, odor and taste not distinctive, lamellae nearly subdistant, moderately broad, adnexed, pallid brownish, becoming “ochraceous-tawny” at maturity; stipe 3–5 cm. long, 2–4.5 mm. thick, equal or narrowed below, solid, sheathed by a “yellow ocher” fibrillose sheath which breaks up into annular patches, silky and silvery whitish above; spores $7.5-9 \times 4-5 \mu$, roughened, ellipsoid.

Gregarious under Douglas fir, Lake Crescent, Washington, Oct. 13, 1935 (3116).

The above collection corresponds well to the recent account given by Lange (11). Rea describes the species as having a strong odor, a character not evident in the American specimens and not attributed to the species by many European investigators. The rather dense fibrillose zones over the basal part of the stipe, and the faint fibrillose covering of the pileus strongly suggest a relationship with certain species of the subgenus *Telamonia*, such as *Cortinarius gentilis* Fr. Lange (11) has suggested that Bresadola’s account of *C. gentilis* really applies to *C. saniosus*, and my specimens strongly support this conclusion. It should be placed in *Telamonia*.

CORTINARIUS DECIPIENS Fr. *sensu* Rea (13).—Pileus 2–4.5 cm. broad, obtusely or acutely conic, becoming broadly campanulate to expanded and with a low conic umbo, surface at first hoary from the thin white fibrillose covering, glabrescent, evenly “Rood’s brown” when young and moist, becoming “buff-pink” and faintly striatulate on the margin, fading to “vinaceous-buff”

or the disk remaining darker, margin incurved at first and sometimes crenate-plicate in age; flesh thin, watery brown, fragile, odor and taste not distinctive; lamellae "ochraceous-tawny" from the first and remaining so at maturity, subdistant to close, moderately broad, bluntly adnate, seceding, edge even but faintly glaucous causing the lamellae to appear pale brownish; stipe 5–7 cm. long, 2.5–4 mm. thick, equal or the base slightly enlarged by adhering white mycelium, white silky fibrillose to the apex at first, with a faint superior fibrillose zone from the broken veil, apex tinged vinaceous, in age somewhat brownish over all but remaining paler than the pileus; spores $7-8 \times 4-5 \mu$, subellipsoid, slightly roughened; sterile cells not differentiated.

Gregarious under spruce, Crescent City, California, Nov. 5, 1937 (8435).

Kauffman (8) was doubtful concerning the presence of this species in North America. The California collection did not possess gills as brightly colored as those described and illustrated by Ricken (14). Rea describes the gills as being colored more like the pileus, and in Cooke's figure, which Rea cites, both the pileus and lamellae are duller in color than they were in my specimens. Apparently the colors of the gills vary considerably, ranging from dark or dull testaceous to paler and brighter vinaceous brown.

CORTINARIUS DAMASCENUS Fr. *sensu* Lange.—Pileus 3–7 cm. broad, obtusely conic, becoming conic campanulate or plane with a low obtuse umbo, the margin elevated at times, margin incurved, hygrophanous, "russet" when moist, margin striatulate and often rimose, fading to near "fawn color" or "avellaneous," glabrous or canescent from scattered whitish fibrils at first, margin faintly silky; flesh fragile, concolorous with the surface, odor and taste not distinctive; lamellae subdistant (30–35 reach the stipe), moderately broad, "russet" or tawny brown from the first, adnate with a tooth, edge minutely floccose or even; stipe 6–15 cm. long, 8–18 mm. thick, usually tapering below, sometimes equal or even subclavate, stuffed-solid, white from a dense coating of appressed fibrils which extends to the lamellae, usually

with a faint fibrillose zone from the broken veil; spores $6-7.5 \times 3.5-4 \mu$.

Cespitose to gregarious under second growth spruce, Crescent City, California, Nov. 12, 1937 (8648); Fort Dick, California, Nov. 14 (8730).

Although growing under conifers, these collections correspond so well with Lange's account of the species that I do not hesitate to place them there. The species was very abundant in the two localities, growing in arcs, scattered or in fasciculate clusters over the needle beds or around old stumps. The whitish appressed fibrillose covering of the stipe is characteristic.

CORTINARIUS MINIATOPUS Lange.—Pileus 10–20 mm. broad, convex to nearly plane, at first evenly “ochraceous-tawny” or paler but soon with an orange-red tinge, margin striate when moist, hygrophanous, fading to pale orange-buff, glabrous but appearing faintly fibrillose under a lens; flesh dull watery brown but changing to “cadmium orange,” especially in the base of the stipe; lamellae moderately broad, subdistant, nearly “ochraceous-orange,” adnate; stipe 2–3 cm. long, 2.5–3.5 mm. thick, equal, fragile, hollow, pallid whitish but soon flushed “cadmium orange” over basal portion or where handled, base faintly fibrillose; spores $7-8 \times 4 \mu$.

Gregarious under spruce, Sept. 11, 1936, Ko Ko Ko Bay, Lake Timagami, Ontario (4808).

CORTINARIUS ACUTUS Fr.—Gregarious under spruce, Crescent City, California, Nov. 3, 1937 (8375). Apparently this species has not been reported previously for our western states.

CORTINARIUS ANGULOSUS Fr.—Gregarious under pine near Grant's Pass, Oregon, Nov. 26 (9094), and near Cave City, Oregon, Dec. 1, 1937 (9272). Kauffman collected it in Colorado but not along the Pacific coast.

CORTINARIUS CASTANEUS Fr.—Gregarious under spruce, Crescent City, California, Nov. 4, 1937 (8406). This species has been known previously in North America only from New York.

CORTINARIUS ERYTHRINUS Fr.—Gregarious under mixed alder and spruce, Crescent City, California, Nov. 4, 1937 (8439). These

specimens were identical with material collected under hardwoods in Michigan and represent the first record of the species from the Pacific coast region.

CORTINARIUS OBTUSUS Fr.—Gregarious under pine, Crescent City, California, Nov. 18, 1937 (8854). Kauffman collected it in the Rocky Mountains and in Oregon.

CORTINARIUS SCANDENS Fr.—Gregarious under spruce, Crescent City, California, Oct. 30 (8225), and Nov. 3, 1937 (8385). Apparently it has not been previously reported from the Pacific coast region.

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Cortinarius ponderosus sp. nov.—The stipe $\times 1$.



Cortinarius pallidifolius sp. nov. $\times 1$.



Cortinarius elatior Fr. × 1.



Cortinarius volvatus sp. nov. $\times 1$.



Cortinarius olympianus sp. nov. $\times 1$.



Cortinarius calyptratus sp. nov. $\times 1$.



Cortinarius cedretorum Maire—Partly expanded fruiting bodies $\times 1$.



Cortinarius glaucopus Fr. $\times 1$.



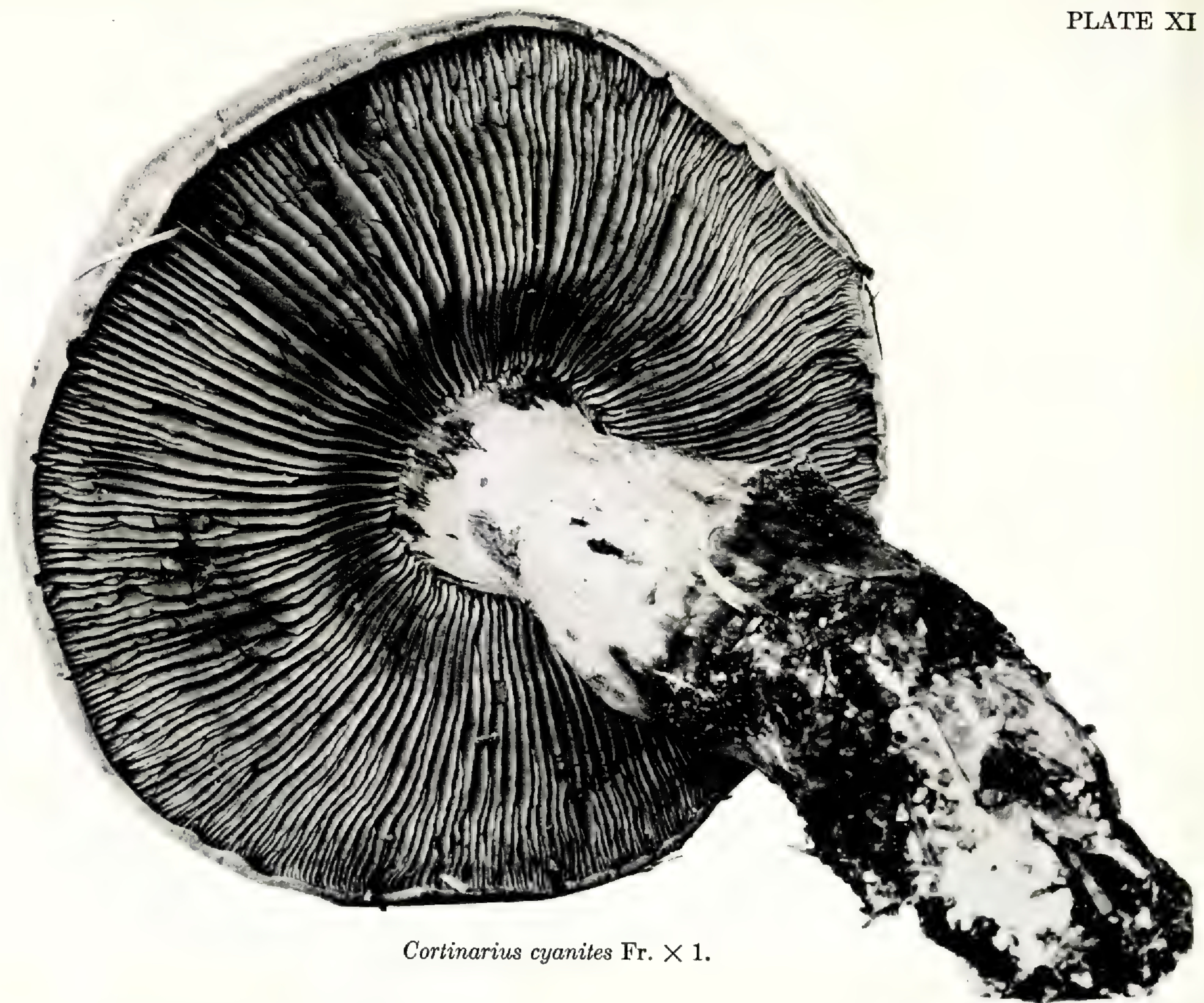
Cortinarius sphagnophilus Pk. $\times 1$.

SMITH

PLATE X



Cortinarius variicolor Fr. $\times 1$.



Cortinarius cyanites Fr. $\times 1$.



Cortinarius californicus sp. nov. $\times 1$.

CONTRIBUTIONS FROM THE UNIVERSITY
OF MICHIGAN HERBARIUM

No. 1. Rusts from British Honduras, by Edwin B. Mains

Notes on Agarics from British Honduras, by Alexander H.
Smith. 28 pp., 2 pls. Price, \$.25. (Issued May 23, 1939.)

No. 2. Studies in the Genus *Cortinarius*. I, by Alexander H. Smith.
42 pp., 12 pls. Price, \$.35.

